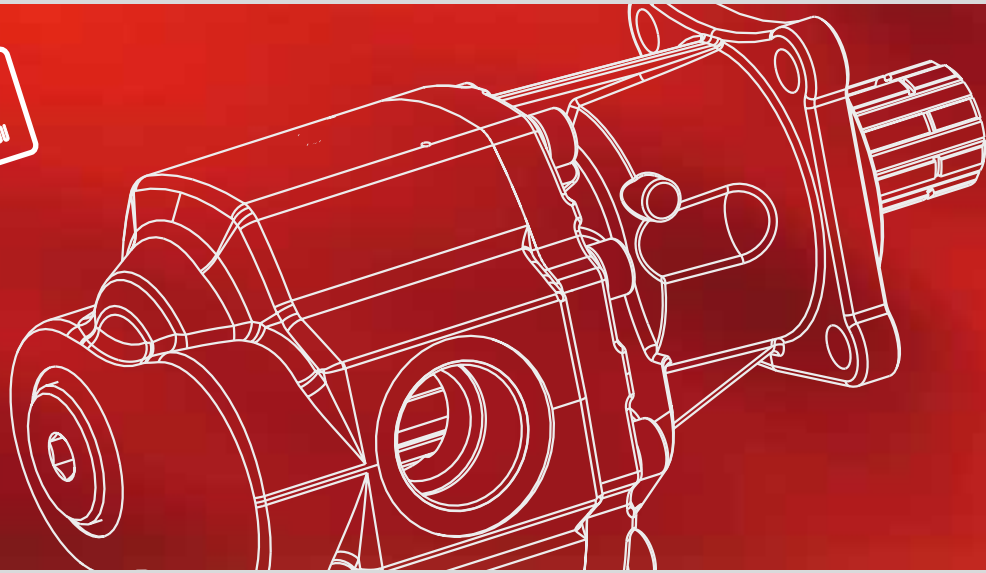


**PATENT
PENDING**



New

HYDRAULIC GEAR
PUMPS
FOR TRUCK
APPLICATIONS

FORMULA[®]
S F P

INDEX

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FEATURES

“SFP” the new line of hydraulic gear pumps of Formula series is available in groups 3 and 3,5. The main features of new Formula “SFP” line are the noise level reduction, the availability of different ports position and the modular and compact design for direct mounting on PTOs.

DISPLACEMENTS

From 2.16 in³/rev (35,43 cm³/rev)
To 7.22 in³/rev (118,31 cm³/rev)

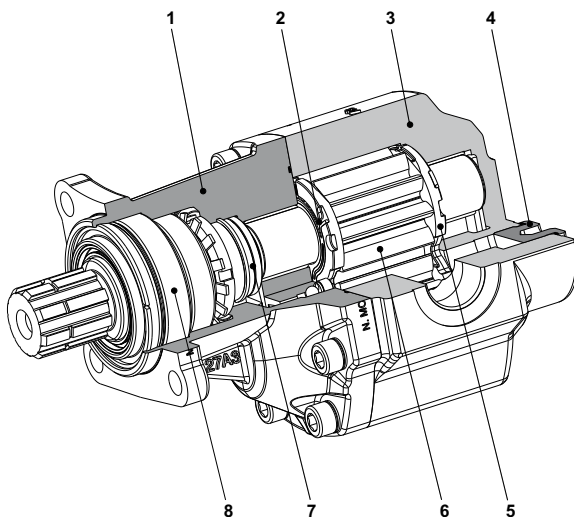
PRESSURE

Max. continuous 4060 psi (280 bar)
Max. intermittent 4350 psi (300 bar)
Max. peak 4495 psi (310 bar)

MAX. SPEED

Max. 2800 min⁻¹

- Two pieces cast iron housing
- High performance also at very low speed
- Different ports position availability
- Low noise level
- Shaft seal system no leakage guarantee
- Modular design
- Direct mounting on the PTOs



1	Mounting flange
2	Seal
3	Body
4	Plug
5	Thrust plate
6	Gear
7	Shaft seal
8	Bearing



Modification from former edition.

02/04.2012

FEATURES

GUARANTEE

CASAPPA provides a two years guarantee for FORMULA pumps on industrial vehicles if used in accordance with the applications and conditions indicated in this technical catalogue.

WARNING !

Failure or improper use of the product can cause damage at the same product or system.

Make sure that this is the last issue.

Replaces: 01/07.2008

Construction	External gear type pumps
Mounting	ISO (ZF), ITALIAN (triangular) and SAE flanges
Line connections	Screw
Direction of rotation (looking at the drive shaft)	Anti-clock (S) - clockwise (D)
Inlet pressure range for pumps	10 ÷ 44 psi - [0,7 ÷ 3 bar (abs.)]
Fluid temperature range	See table (1)
Fluid	Mineral oil based hydraulic fluids to ISO/DIN and fire resistant fluids [see table (1)]. For other fluids please consult our technical sales department.
Viscosity range	From 60 to 456 SSU [12 to 100 mm ² /s (cSt)] recommended Up to 3410 SSU [750 mm ² /s (cSt)] permitted
Filtering requirement	See table (2)
Anti-oxidant protection	Red painting IC105

Tab. 1

Type	Fluid composition	Max pressure psi (bar)	Max speed min ⁻¹	Temperature °F (°C)			Seals (◆)
				Min	Max contiuous	Max peak	
ISO/DIN	Mineral oil based hydraulic fluid to ISO/DIN	See page 5	See page 5	-13 (-25)	176 (80)	212 (100)	N
				-13 (-25)	230 (110)	257 (125)	V
HFA	Oil emulsion in water 5 ÷ 15% of oil	725 (50)	1500	36 (2)	131 (55)	-	N
HFB	Water emulsion in oil 40 % of water	1740 (120)	1500	36 (2)	140 (60)	-	N
HFC	Water - glycol	1450 (100)	1500	-4 (-20)	140 (60)	-	N Bz
HFD	Phosphate ester (●)	2175 (150)	1500	14 (-10)	176 (80)	-	V Bz

(◆) **N**= Buna N (standard) - **V**= Viton - **N Bz**= Buna N and Bronze thrust plates - **V Bz**= Viton and Bronze thrust plates.

(●) For skydrol phosphate esters please consult our technical sales department.

02/04.2012

Tab. 2

Working pressure psi (bar)	$\Delta p < 2030$	$2030 < \Delta p < 3045$	$\Delta p > 3045$
	$\Delta p < (140)$	$(140) < \Delta p < (210)$	$\Delta p > (210)$
Contamination class NAS 1638	10	9	8
Contamination class ISO 4406:1999	21/19/16	20/18/15	19/17/14
Achieved with filter $\beta_{10}(c) \geq 200$ according to ISO 16889	-	10 μ m	10 μ m
Achieved with filter $\beta_{25}(c) \geq 200$ according to ISO 16889	25 μ m	-	-

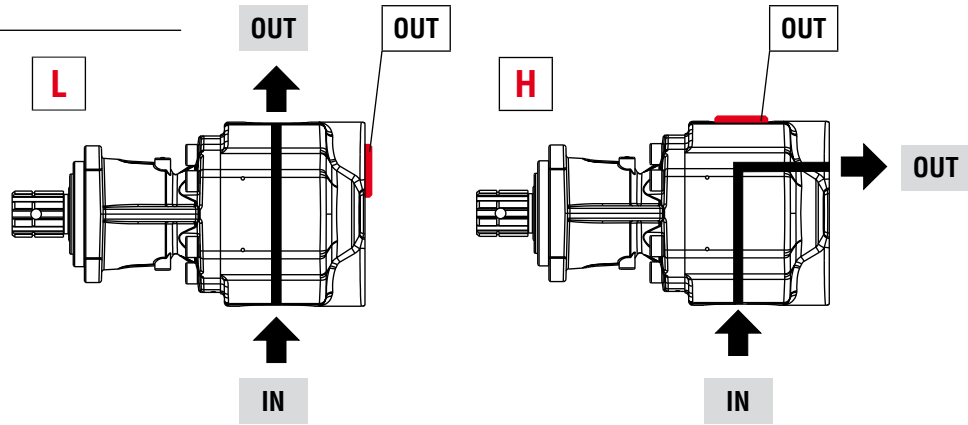
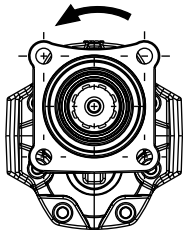
Casappa recommends to use its own production filters:



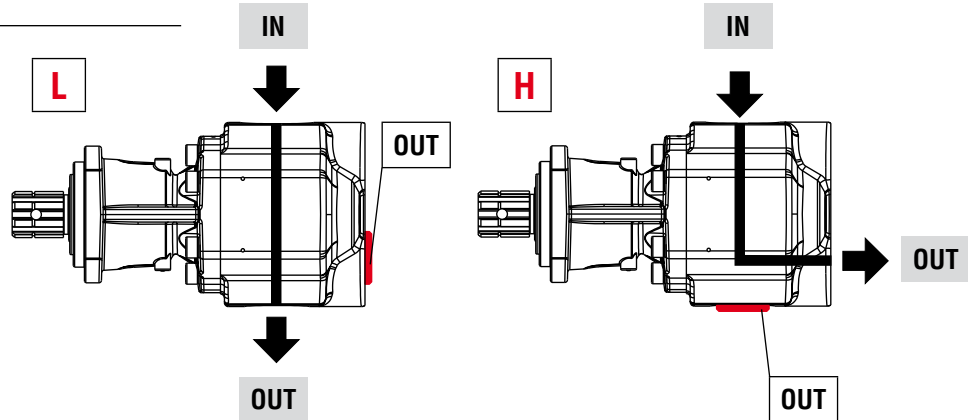
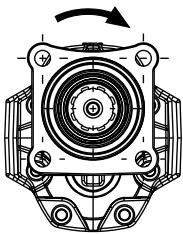
PORTS POSITION

“SFP” Formula pumps are available with three ports; one inlet and two outlet. They are supplied in version L with a plug on the rear outlet ports. Version H is obtained just switching the plug from the rear port to the side port. Version with rear ports is available on request. For more information please consult our technical sales department.

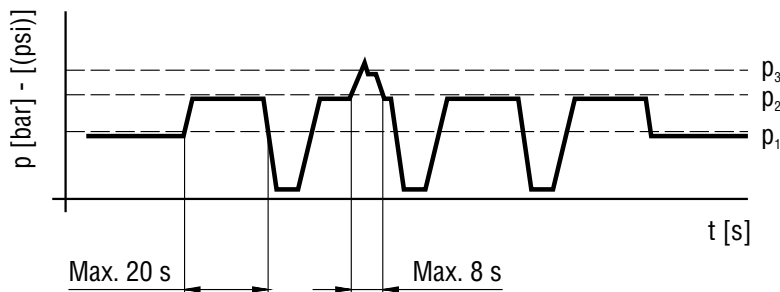
ANTI-CLOCK ROTATION



ANTI-CLOCK ROTATION



PRESSURE DEFINITION



- p_1 Max. continuous pressure
- p_2 Max. intermittent pressure
- p_3 Max. peak pressure

01/07.2008

GENERAL NOTES

Available with different inlet and outlet ports. Standard pumps are equipped with BUNA N (N) seals for temperature up to 176 °F (80 °C), for particular operating conditions (V) VITON seals and BUNA or VITON seals with bronze thrust plates (N Bz), (V Bz) are available. If you use fire resistant fluids specify the type when ordering. For more information please consult our technical sales department.

GENERAL DATA PUMPS

Replaces: 01/07.2008

Pump type	Displacement in ³ /rev (cm ³ /rev)	Max. pressure			Intermittent max. speed		Min. speed
		p ₁	p ₂	p ₃	At p ₂ press.	Without load	At p ₂ press.
		psi (bar)			min ⁻¹		
SFP 30•34	2.16 (35,43)	4060 (280)	4350 (300)	4495 (310)	2800	4200	300
SFP 30•43	2.75 (45,09)	3915 (270)	4205 (290)	4350 (300)	2500	3500	300
SFP 30•51	3.24 (53,14)	3625 (250)	3915 (270)	4060 (280)	2500	3500	300
SFP 30•61	3.83 (62,80)	3335 (230)	3625 (250)	3770 (260)	2500	3500	300
SFP 30•73	4.62 (75,68)	2973 (205)	3408 (235)	3480 (240)	2250	3500	300
SFP 30•82	5.11 (83,74)	2828 (195)	3263 (225)	3335 (230)	2250	3500	300
SFP 35•90	5.86 (95,99)	3335 (230)	3625 (250)	3843 (265)	2250	3500	300
SFP 35•100	6.40 (104,92)	3190 (220)	3480 (240)	3698 (255)	2250	3500	300
SFP 35•112	7.22 (118,31)	2973 (205)	3263 (225)	3480 (240)	2250	3500	300

 p₁= Max. continuous pressure

 p₂= Max. intermittent pressure

 p₃= Max. peak pressure

For different working conditions please consult our technical sales department.

DESIGN CALCULATIONS FOR PUMPS

02/04.2012

Q	US gpm (l/min)	Flow
M	lbf in (Nm)	Torque
P	HP (kW)	Power
V	in ³ /rev (cm ³ /rev)	Displacement
n	min ⁻¹	Speed
Δp	psi (bar)	Pressure
$\eta_v = \eta_v(V, \Delta p, n)$	($\approx 0,98$)	Volumetric efficiency
$\eta_{hm} = \eta_{hm}(V, \Delta p, n)$	($\approx 0,90$)	Hydro-mechanical efficiency
$\eta_t = \eta_v \cdot \eta_{hm}$	($\approx 0,88$)	Overall efficiency

$$Q = Q_{theor.} \cdot \eta_v$$

$$Q_{theor.} = \frac{V \text{ (cm}^3\text{/rev)} \cdot n \text{ (min}^{-1}\text{)}}{1000} \quad [\text{l/min}]$$

$$M = \frac{M_{theor.}}{\eta_{hm}} \quad [\text{Nm}]$$

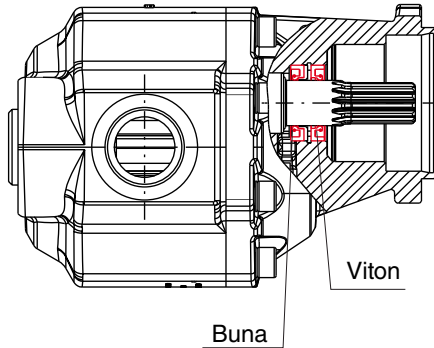
$$M_{theor.} = \frac{\Delta p \text{ (bar)} \cdot V \text{ (cm}^3\text{/rev)}}{62,83}$$

$$P_{IN} = \frac{P_{OUT}}{\eta_t} \quad [\text{kW}]$$

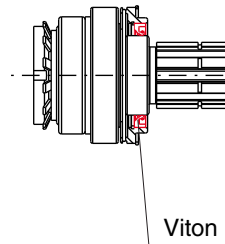
$$P_{OUT} = \frac{\Delta p \text{ (bar)} \cdot Q \text{ (l/min)}}{600}$$

LEAKAGE FREE - ISO STANDARD 16 Z0

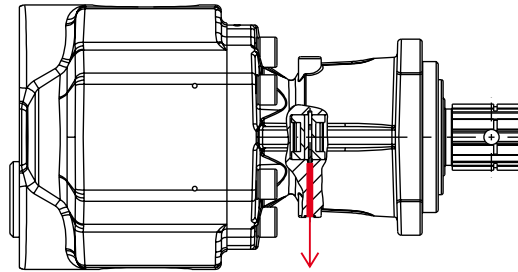
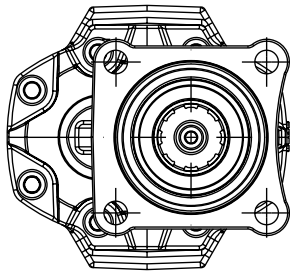
Base pump - version 0



Support kit - version 5



Two shaft seals on the pump and one on the support guarantee a perfect seals avoiding the oil exchange between the hydraulic circuit and the gear box; catastrophic failures are eliminated.



In case of failure, a safety system between the shaft seals of the pump allows the oil to escape, but doesn't allow the entry of contamination into the pump.

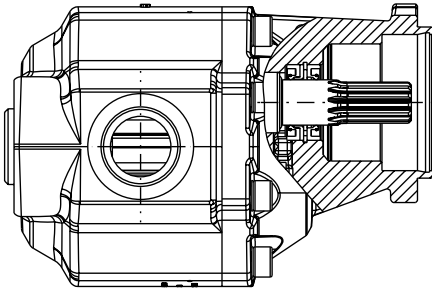
We recommend to mount the pumps with the hole in horizontal position or even better facing down.

01/07.2008

SFP 30

MODULAR DESIGN

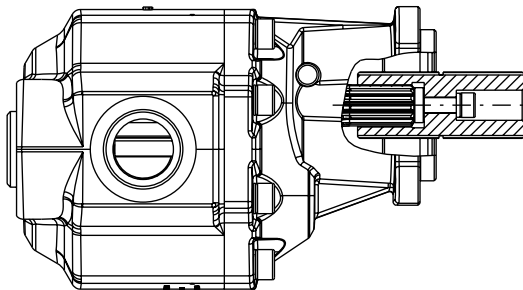
Base pump - version 0 - L8 Z0



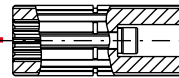
Starting from one pump you can have more versions using different kit.

ISO standard - version 0 - 16 Z0

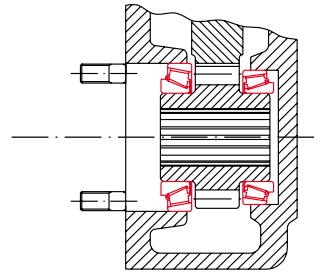
For PTOs applications with support



Coupling kit - version 0

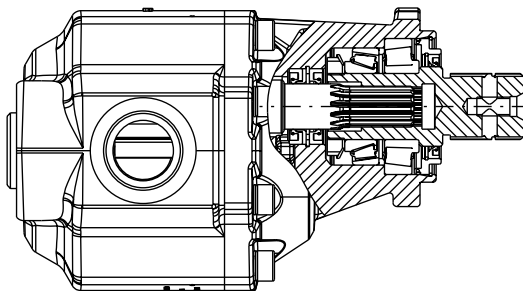


PTOs with support

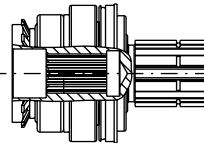


ISO standard - version 5 - 16 Z0

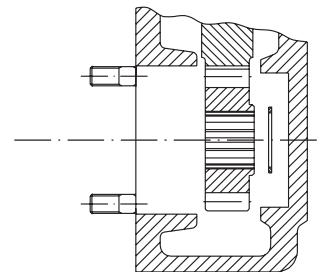
For PTOs applications without support



Support kit - version 5



PTOs without support

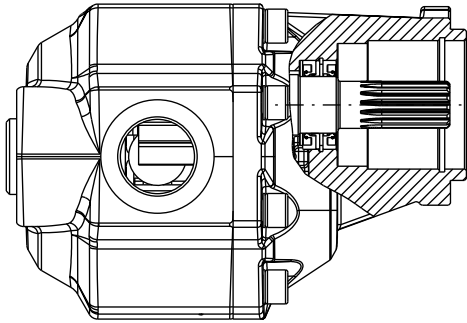


01/07:2008

SFP 35

MODULAR DESIGN

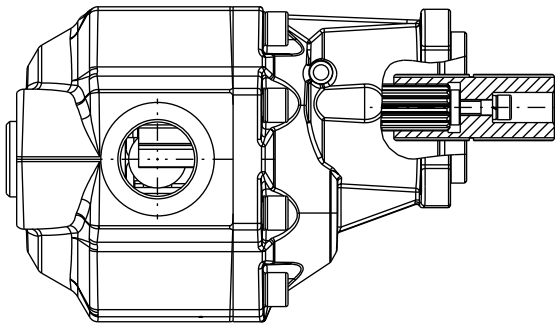
Base pump - version 0 - F9 Z0



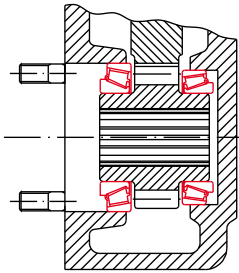
Starting from one pump you can have more versions using different kit.

ISO standard - version 0 - 16 Z0

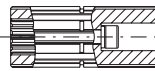
For PTOs applications with support



PTOs with support

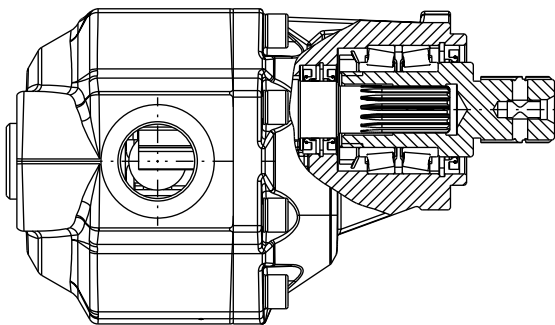


Coupling kit - version 0

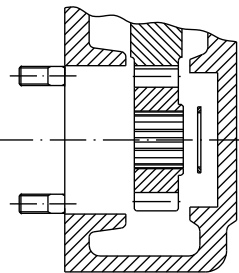


ISO standard - version 5 - 16 Z0

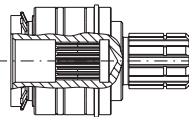
For PTOs applications without support



PTOs without support

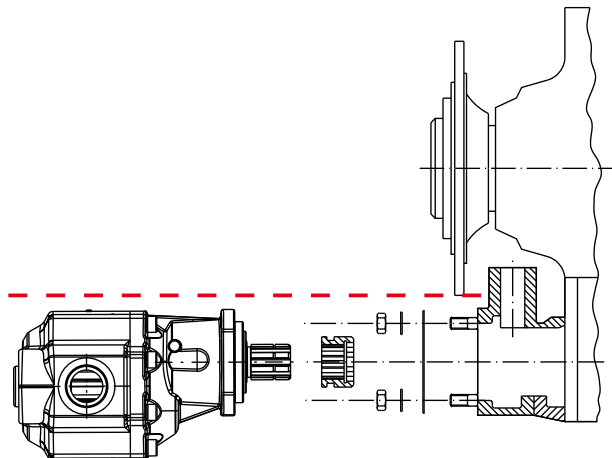


Support kit - version 5



MOUNTING ON DIRECT PTOs WITH ISO FLANGE

The new Formula SFP 35, specifically designed to avoid interference with the transmission shaft of truck, can be mounted on direct power take-off.



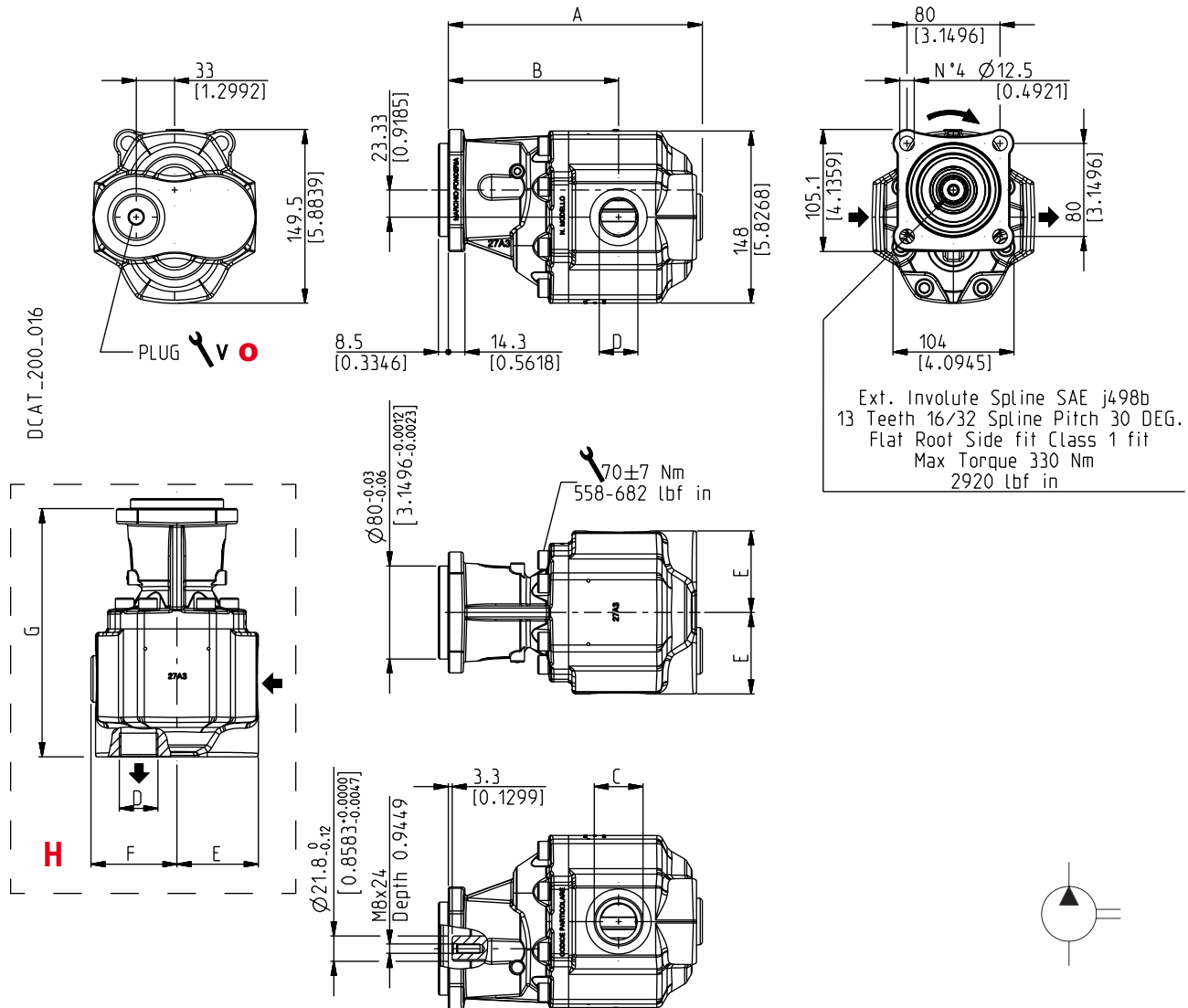
01/07.2008

SFP 30

BASE MODEL HYDRAULIC GEAR PUMPS VERSION 0

L8 Z0

Replaces: 01/07.2008



01/03.2010

Pump type	A	B	C (◆)	D (◆)	E	F	G	V
	mm (in)	mm (in)	IN (BSPP)	OUT (BSPP)	mm (in)	mm (in)	mm (in)	Nm (lbf in)
SFP 30•34	189 (7.441)	130,5 (5.138)	G 3/4	G 3/4			183,5 (7.224)	90 ±9 (717 ÷ 876)
SFP 30•43	195 (7.677)	127,5 (5.020)			64 (2.520)	68 (2.677)	189,5 (7.461)	
SFP 30•51	200 (7.874)	132,5 (5.217)	G1				194,5 (7.657)	
SFP 30•61	206 (8.110)	138,5 (5.453)		G1			200,5 (7.894)	130 ±13 (1036 ÷ 1266)
SFP 30•73	214 (8.425)	141,5 (5.571)			70 (2.756)	74 (2.913)	208,5 (8.209)	
SFP 30•82	219 (8.622)	146,5 (5.768)	G 1 1/4				213,5 (8.406)	

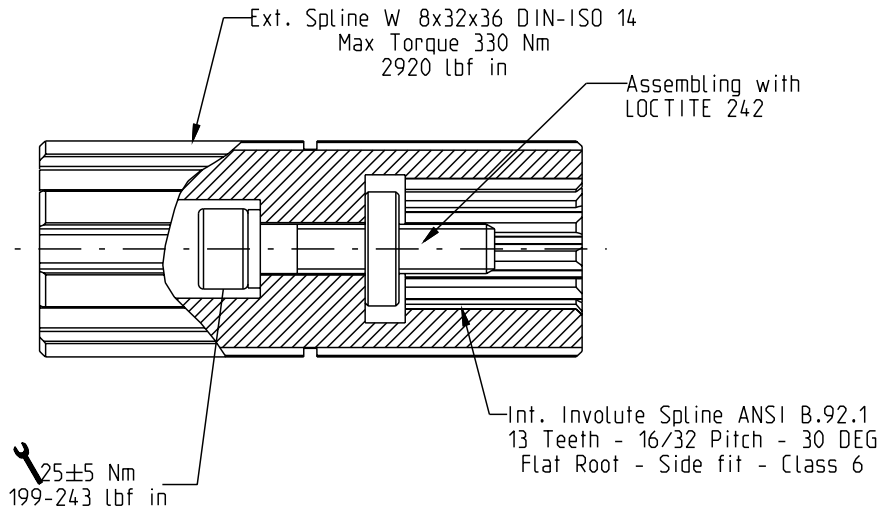
Rotation: S=left - D=right
How to order:

(◆) GAS STRAIGHT THREAD PORTS
For more information see page 18

SFP 30•34 S0-L8 Z0-(H)L GE/GE-N-QW

SFP 30

COUPLING KIT VERSION 0



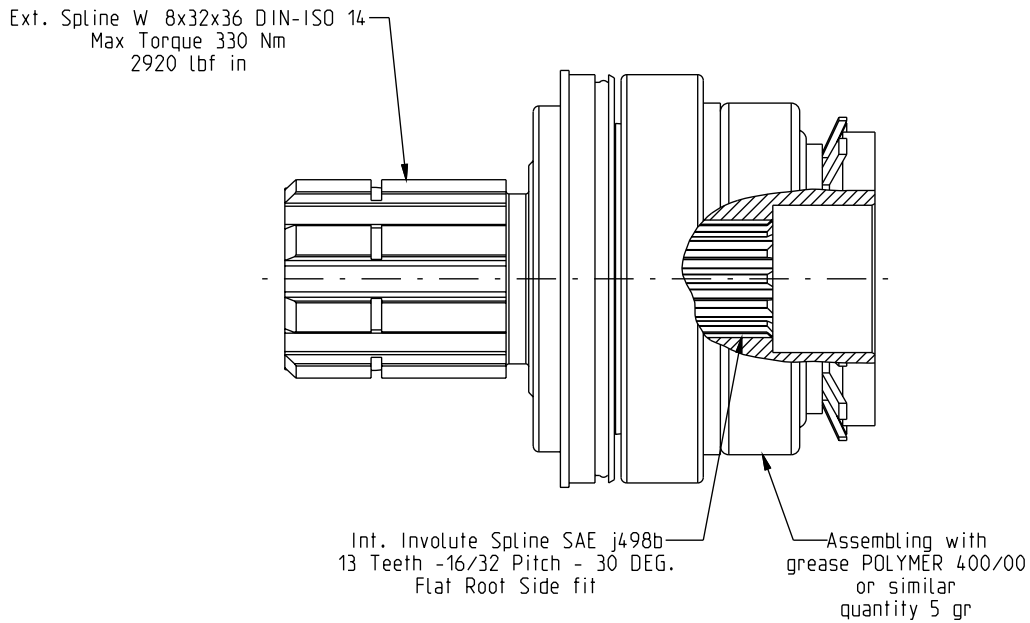
Orderin Code:

62024007

COUPLING KIT FP30-0-16 Z0-L8

SFP 30

SUPPORT KIT VERSION 5



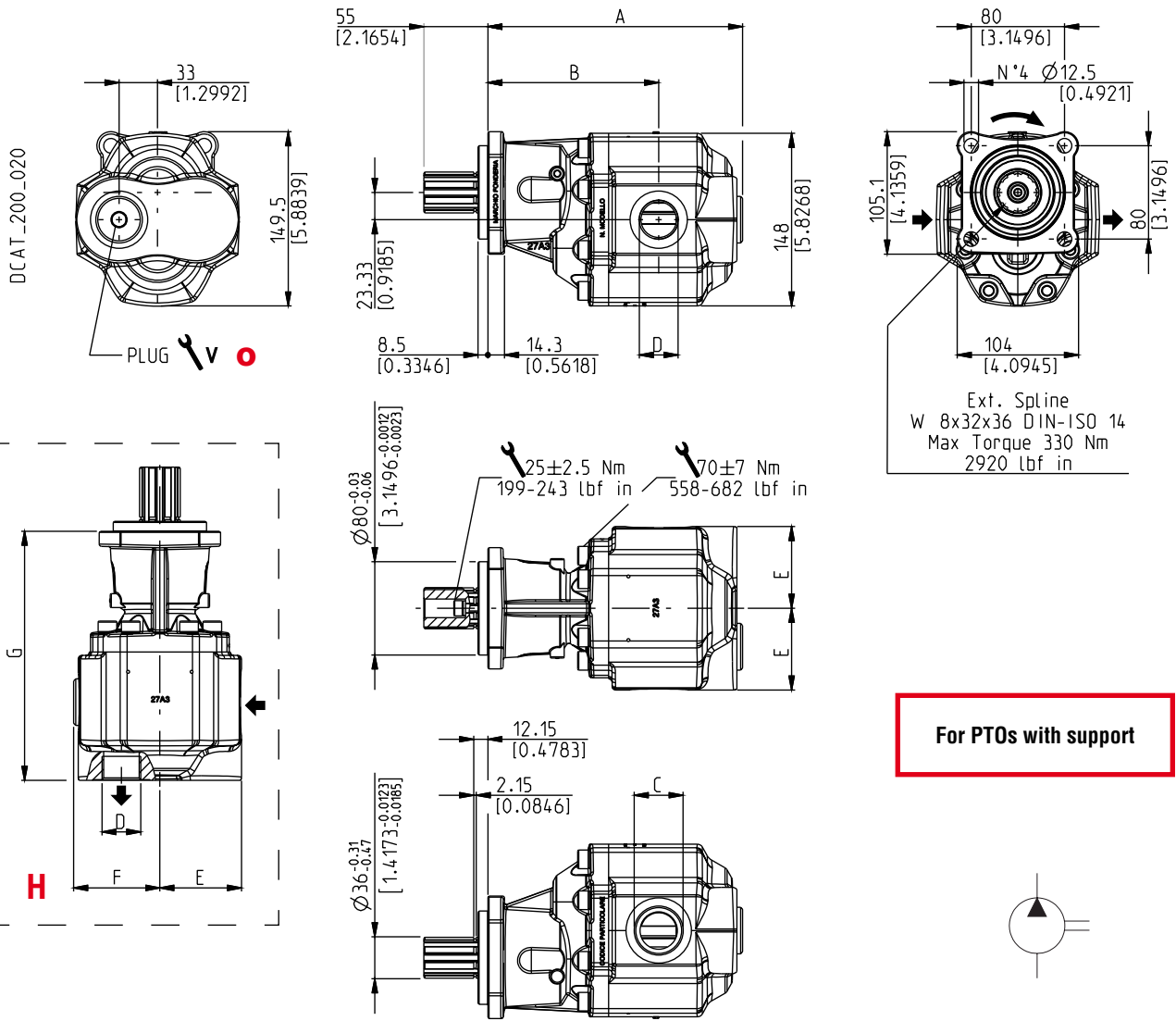
Orderin Code:

62024006

SUPPORT KIT FP30-5-16 Z0-L8

01/07.2008

Replaces: 01/07.2008



For PTOs with support



Pump type	A	B	C (◆)	D (◆)	E	F	G	V
	mm (in)	mm (in)	IN (BSPP)	OUT (BSPP)	mm (in)	mm (in)	mm (in)	Nm (lbf in)
SFP 30•34	189 (7.441)	130,5 (5.138)	G 3/4	G 3/4			183,5 (7.224)	90 ±9 (717 ÷ 876)
SFP 30•43	195 (7.677)	127,5 (5.020)			64 (2.520)	68 (2.677)	189,5 (7.461)	
SFP 30•51	200 (7.874)	132,5 (5.217)	G1				194,5 (7.657)	
SFP 30•61	206 (8.110)	138,5 (5.453)		G1			200,5 (7.894)	130 ±13 (1036 ÷ 1266)
SFP 30•73	214 (8.425)	141,5 (5.571)			70 (2.756)	74 (2.913)	208,5 (8.209)	
SFP 30•82	219 (8.622)	146,5 (5.768)	G 1 1/4				213,5 (8.406)	

01/03.2010

S
D

0-16 Z0

Rotation: S=left - D=right
How to order:

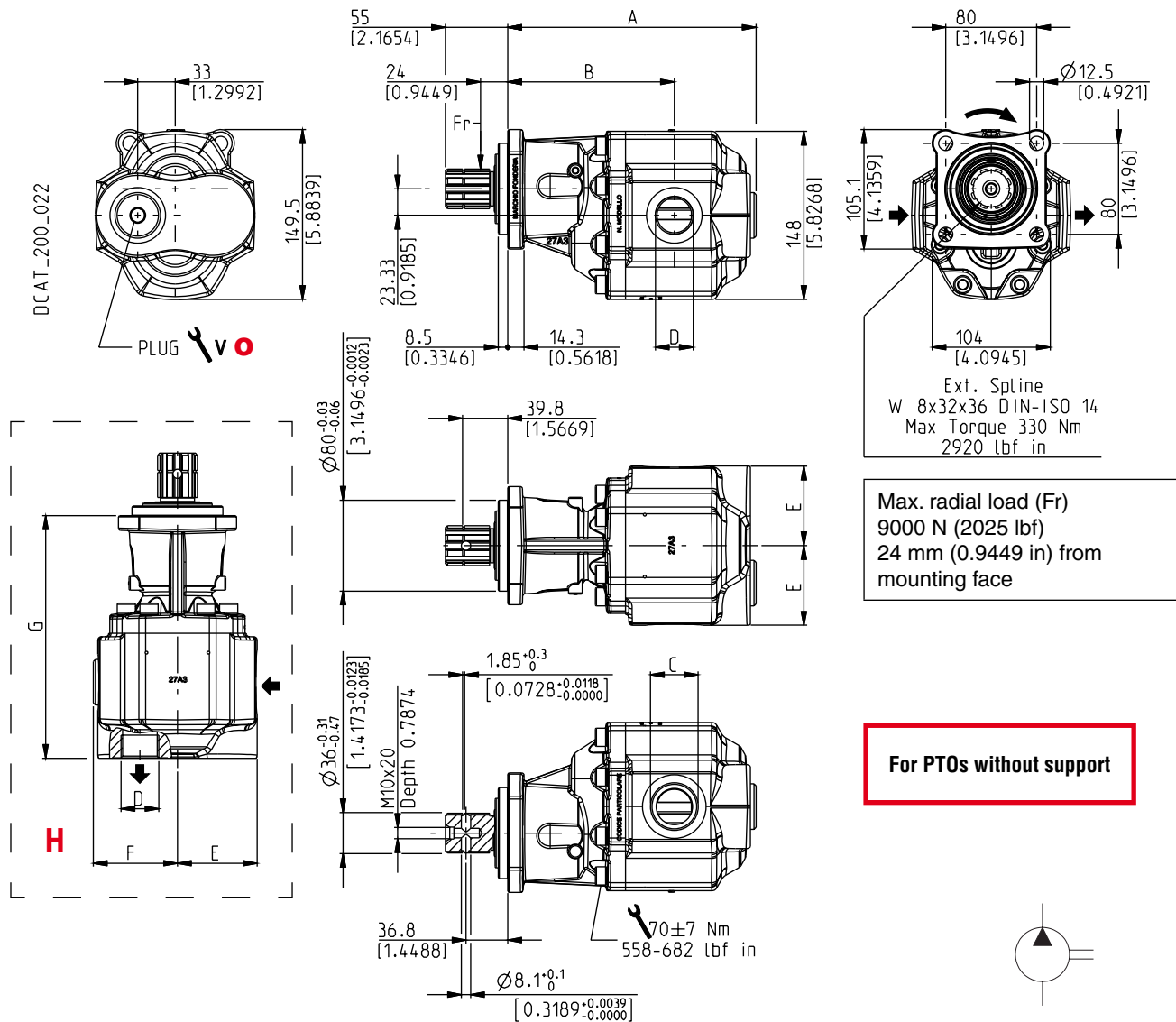
(◆) GAS STRAIGHT THREAD PORTS
For more information see page 18

SFP 30•34 S0-16 Z0-(H)L GE/GE-N-QW

SFP 30

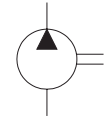
HYDRAULIC GEAR PUMPS ISO STANDARD VERSION 5

16 Z0



Replaces: 01/07.2008

For PTOs without support



Pump type	A	B	C (◆)		E	F	G	V
			IN (BSPP)	OUT (BSPP)				
SFP 30•34	189 (7.441)	130,5 (5.138)	G 3/4	G 3/4			183,5 (7.224)	90 ±9 (717 ÷ 876)
SFP 30•43	195 (7.677)	127,5 (5.020)			64 (2.520)	68 (2.677)	189,5 (7.461)	
SFP 30•51	200 (7.874)	132,5 (5.217)	G1				194,5 (7.657)	
SFP 30•61	206 (8.110)	138,5 (5.453)		G1			200,5 (7.894)	130 ±13 (1036 ÷ 1266)
SFP 30•73	214 (8.425)	141,5 (5.571)			70 (2.756)	74 (2.913)	208,5 (8.209)	
SFP 30•82	219 (8.622)	146,5 (5.768)	G 1 1/4				213,5 (8.406)	

Rotation: S=left - D=right
How to order:

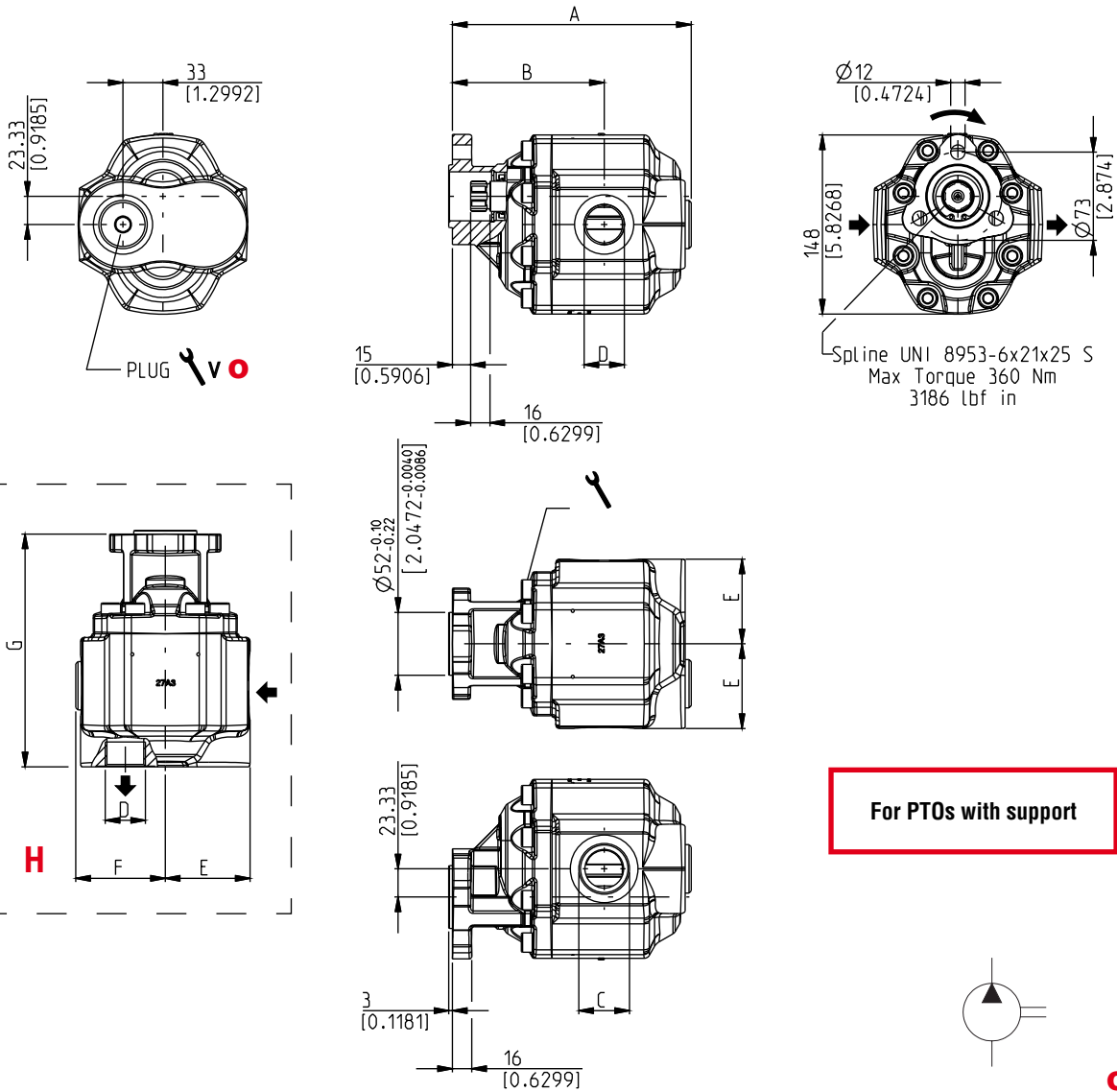
(◆) GAS STRAIGHT THREAD PORTS
For more information see page 18

SFP 30•34 S5-16 Z0-(H)L GE/GE-N-QW

01/03.2010

Replaces: 01/07.2008

DCAT_200_017



For PTOs with support

Pump type	A	B	C (◆)	D (◆)	E	F	G	V
	mm (in)	mm (in)	IN (BSPP)	OUT (BSPP)	mm (in)	mm (in)	mm (in)	Nm (lbf in)
SFP 30•34	168 (6.614)	109,5 (4.311)	G 3/4	G 3/4			162,5 (6.398)	90 ±9 (717 ÷ 876)
SFP 30•43	174 (6.850)	106,5 (4.193)			64 (2.520)	68 (2.677)	178,5 (7.028)	
SFP 30•51	179 (7.047)	111,5 (4.390)	G1				173,5 (6.831)	
SFP 30•61	185 (7.283)	117,5 (4.626)		G1			179,5 (7.067)	130 ±13 (1036 ÷ 1266)
SFP 30•73	193 (7.598)	120,5 (4.744)			70 (2.756)	74 (2.913)	187,5 (7.382)	
SFP 30•82	198 (7.795)	125,5 (4.941)	G 1 1/4				192,5 (7.579)	

01/03.2010

S D

0-19 T1

Rotation: S=left - D=right
How to order:

(◆) GAS STRAIGHT THREAD PORTS
For more information see page 18

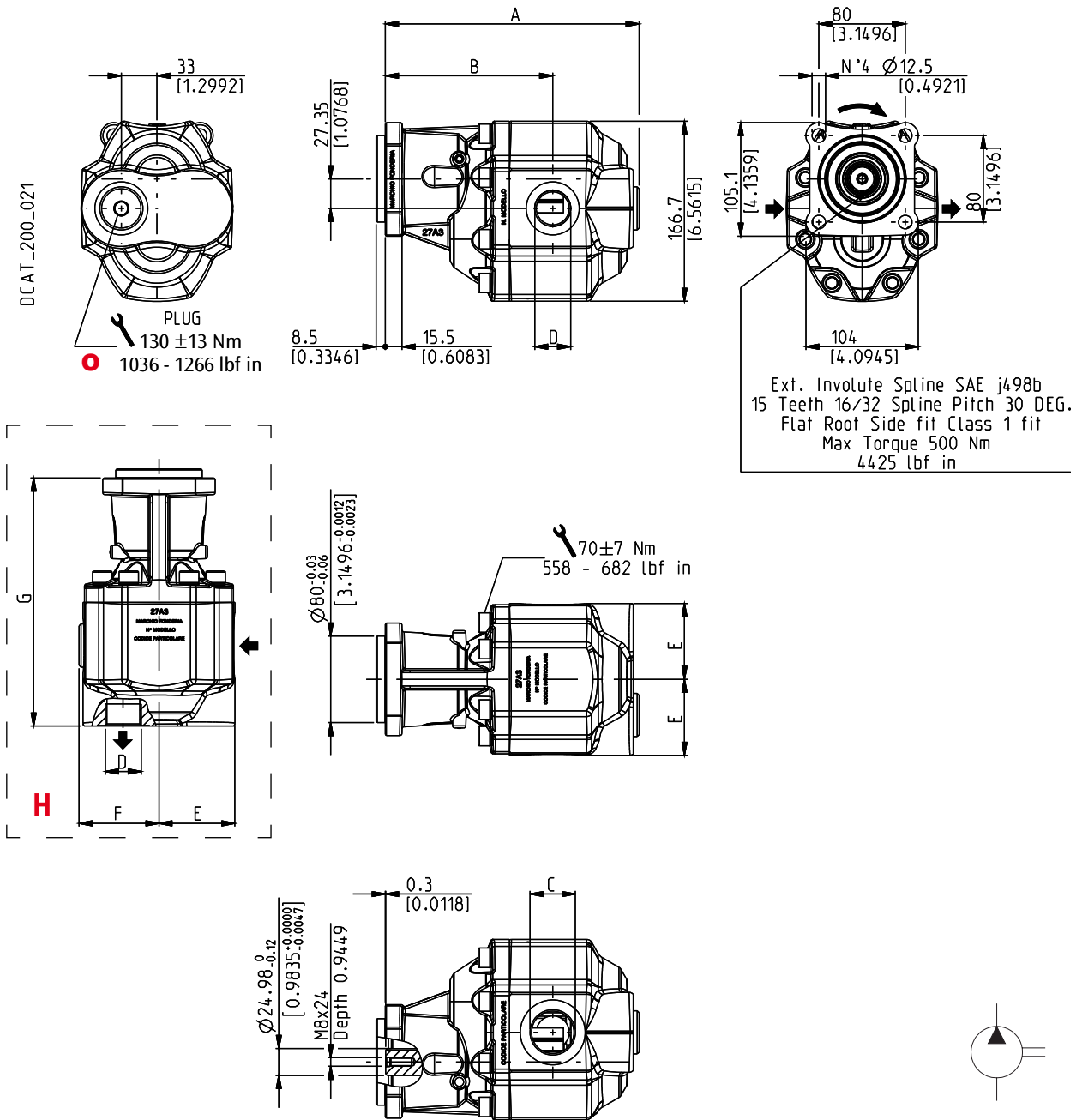
SFP 30•34 S0-19 T1-(H)L GE/GE-N-QW

SFP 35

BASE MODEL HYDRAULIC GEAR PUMPS VERSION 0

F9 Z0

Replaces: 01/07.2008



Pump type	A	B	C (◆)	D (◆)	E	F	G
SFP 35•90	235 (9.252)	155 (6.102)					229,5 (9.035)
SFP 35•100	239 (9.409)	159 (6.260)	G 1 1/4	G1	70,2 (2.764)	74 (2.913)	233,5 (9.193)
SFP 35•112	245 (9.646)	165 (6.496)					239,5 (9.429)

Rotation: S=left - D=right
How to order:

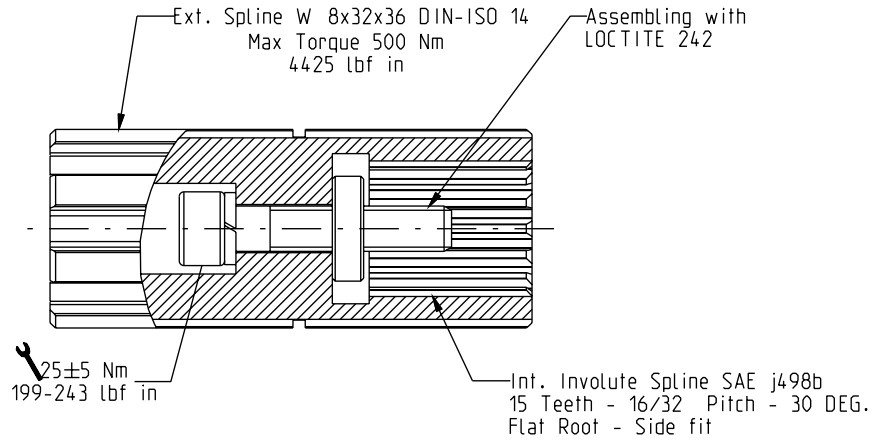
(◆) GAS STRAIGHT THREAD PORTS
For more information see page 18

SFP 35•90 S0-F9 Z0-(H)L GG/GF-N-QW

01/03.2010

SFP 35

COUPLING KIT VERSION 0



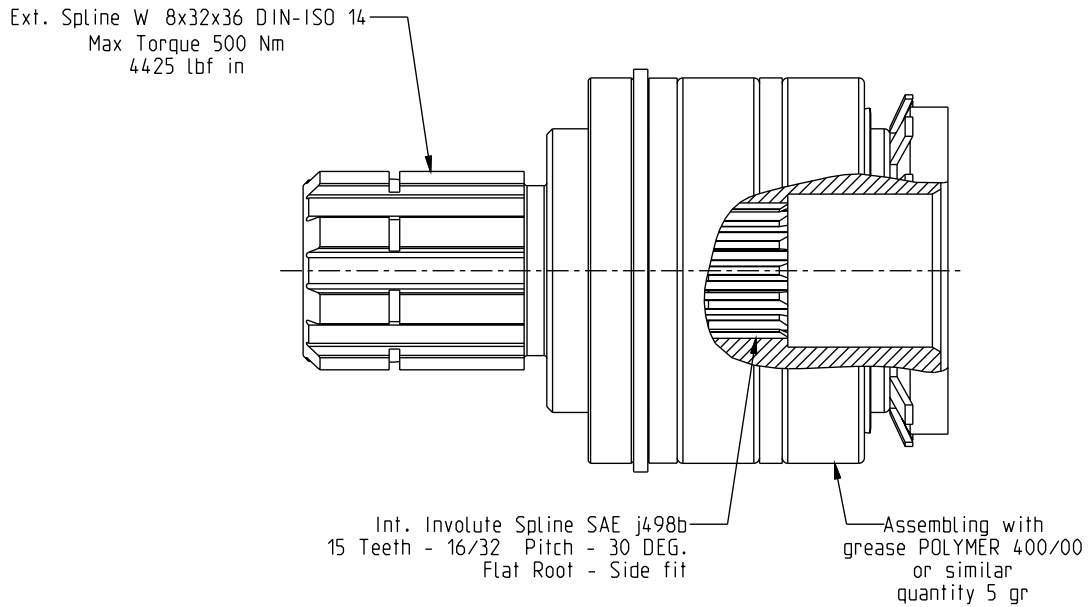
Orderin Code:

62024101

COUPLING KIT FP 35 - 0 - 16 Z0 - F9

SFP 35

SUPPORT KIT VERSION 5



01/07.2008

Orderin Code:

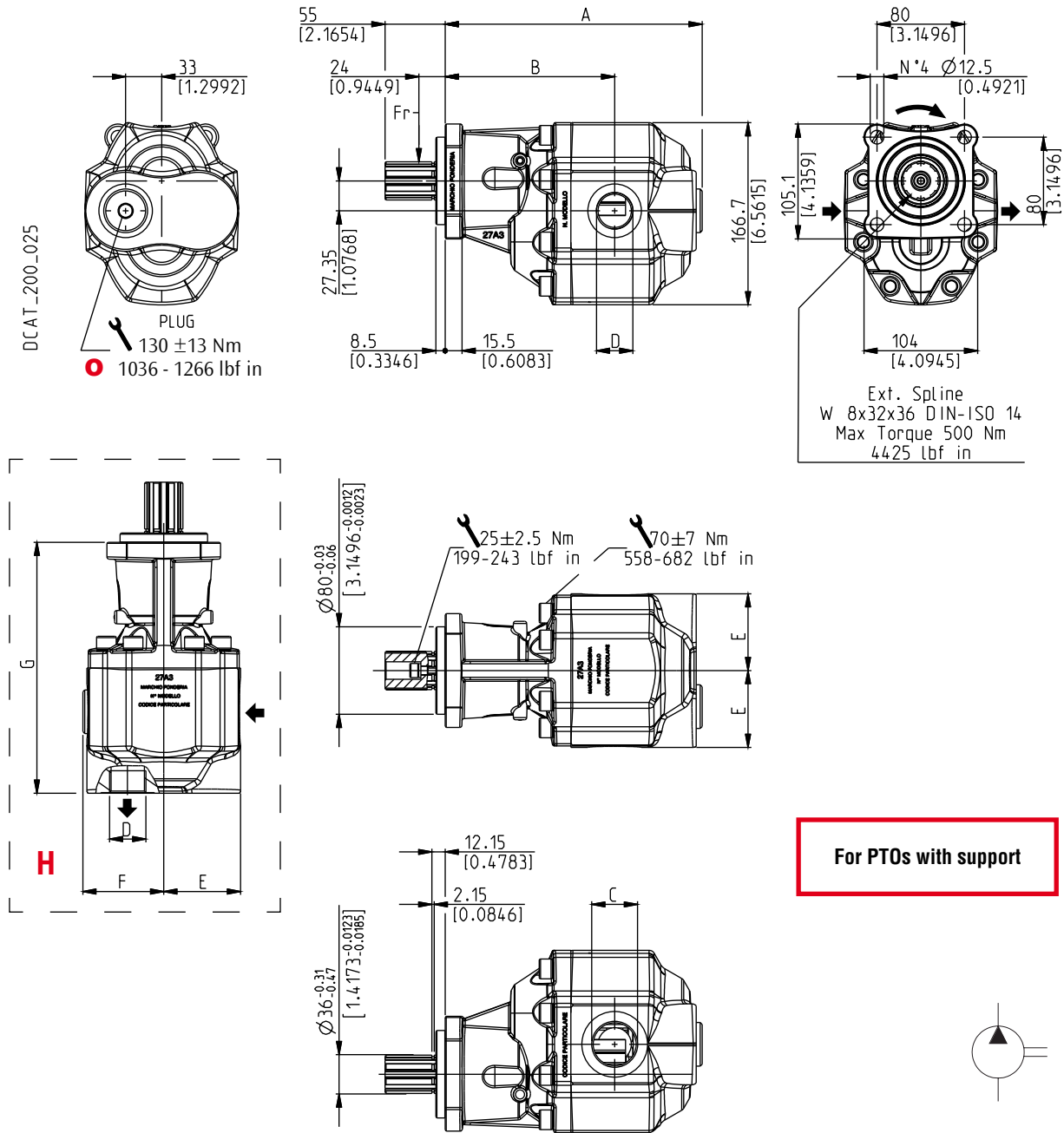
62024100

SUPPORT KIT FP 35 - 5 - 16 Z0 - F9

SFP 35

HYDRAULIC GEAR PUMPS ISO STANDARD VERSION 0

16 Z0



Replaces: 01/07.2008

Pump type	A	B	C (◆)	D (◆)	E	F	G
SFP 35•90	235 (9.252)	155 (6.102)					229,5 (9.035)
SFP 35•100	239 (9.409)	159 (6.260)	G 1 1/4	G1	70,2 (2.764)	74 (2.913)	233,5 (9.193)
SFP 35•112	245 (9.646)	165 (6.496)					239,5 (9.429)

Rotation: S=left - D=right
How to order:

(◆) GAS STRAIGHT THREAD PORTS
For more information see page 18

SFP 35•90 S0-16 Z0-(H)L GG/GF-N-QW

01/03.2010

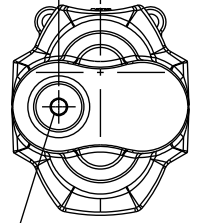
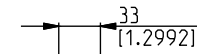
SFP 35

HYDRAULIC GEAR PUMPS ISO STANDARD VERSION 5

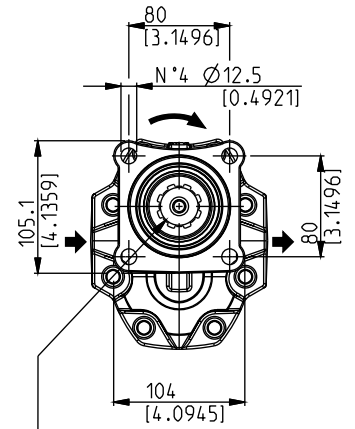
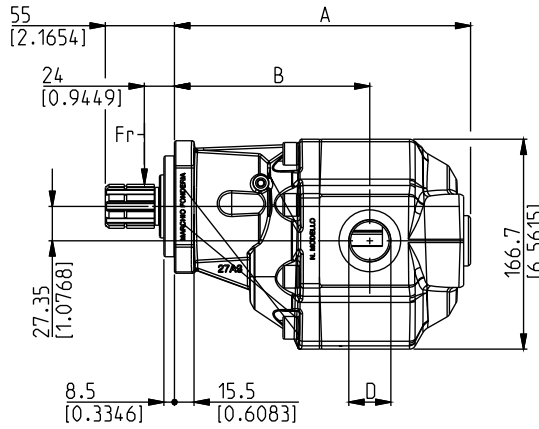
16 Z0

Replaces: 01/07.2008

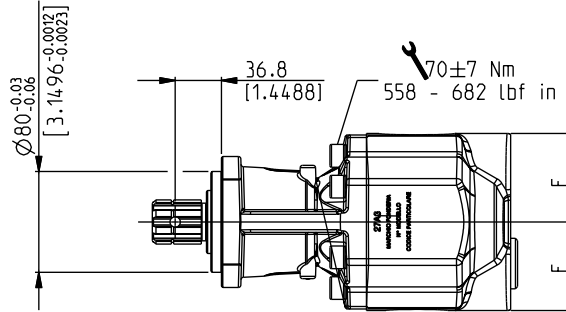
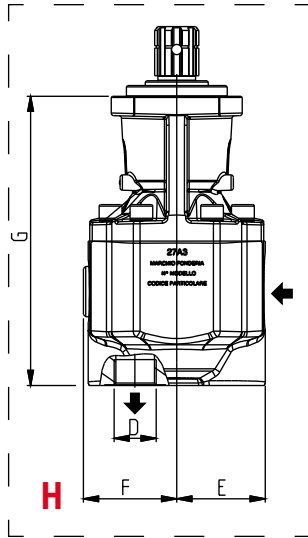
DCAT_200_026



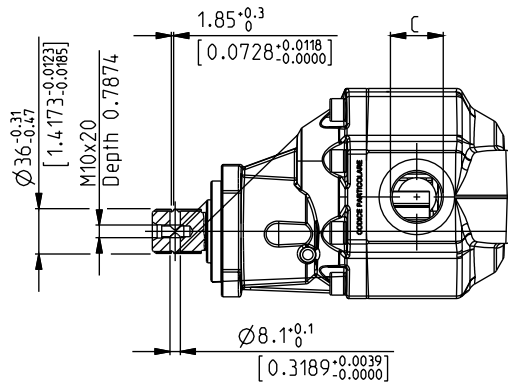
PLUG
130 ± 13 Nm
1036 - 1266 lbf in



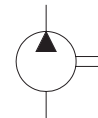
Ext. Spline
W 8x32x36 DIN-ISO 14
Max Torque 500 Nm
4425 lbf in



Max. radial load (Fr)
9000 N (2025 lbf)
24 mm (0.9449 in) from
mounting face



For PTOs without support



01/03.2010


Pump type	A	B	C (◆)	D (◆)	E	F	G
SFP 35•90	235 (9.252)	155 (6.102)					229,5 (9.035)
SFP 35•100	239 (9.409)	159 (6.260)	G 1 1/4	G1	70,2 (2.764)	74 (2.913)	233,5 (9.193)
SFP 35•112	245 (9.646)	165 (6.496)					239,5 (9.429)


Rotation: S=left - D=right
How to order:

(◆) GAS STRAIGHT THREAD PORTS
For more information see page 18

SFP 35•90 S5-16 Z0-(H)L GG/GF-N-QW

PORT SIZES

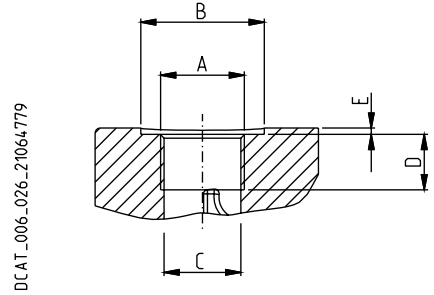
 Tightening torque for low pressure side port

 Tightening torque for high pressure side port (values obtained at 350 bar)



GAS STRAIGHT THREAD PORTS

BSPP

British standard pipe parallel (55°) conforms to UNI - ISO 228



DCAT_006_026_21064779

CODE	Nominal size	A	Ø B	Ø C	D	E		
			mm (inch)	mm (inch)	mm (inch)	mm (inch)	mm (inch)	Nm (lbf in)
GE	3/4"	G 3/4	39 (1.5354)	24,5 (0.9646)	18 (0.7087)	Max. 1 (0.039)	30 ^{+2,5} (266 ÷ 288)	90 ⁺⁵ (797 ÷ 841)
GF	1"	G 1	49 (1.9291)	30,5 (1.2008)	20 (0.7874)	Max. 1 (0.039) Max. 1,2 (◆) (0.047)	50 ^{+2,5} (443 ÷ 465)	130 ⁺¹⁰ (1151 ÷ 1239)
GG	1" 1/4	G 1 1/4	56 (2.2047) 60 (◆) (2.362)	39,3 (1.5472)	20 (0.7874)	Max. 1 (0.039) Max. 1,2 (◆) (0.047)	70 ⁺⁵ (620 ÷ 664)	170 ⁺¹⁵ (1505 ÷ 1637)

(◆) For SFP 35

01/07.2008

INSTRUCTIONS

INSTALLATION

The direction of rotation of single-rotation pumps must be the same as that of the drive shaft. Check that the coupling flange correctly aligns the transmission shaft and the pump shaft.

For pumps version 0 the connection do not generate an axial or radial load on the pump shaft. For pumps version 5 please consult the values indicated in this catalogue.

TANK

Tank capacity must be sufficient for the system's operating conditions (~ 3 times the amount of oil in circulation) to avoid overheating of the fluid. A heat exchanger should be installed if necessary. The intake and return lines in the tank must be spaced apart (by inserting a vertical divider) to prevent the return-line oil from being taken up again immediately.

LINES

The lines must have a major diameter which is at least as large as the diameter of pump ports, and must be perfectly sealed.

To reduce loss of power, the lines should be as short as possible, reducing the sources of hydraulic resistance (elbow, throttling, gate valves, etc.) to a minimum. A length of flexible tubing is recommended to reduce the transmission of vibrations.

All return lines must end below the minimum oil level, to prevent foaming. Before connecting the lines, remove any plugs and make sure that the lines are perfectly clean.

FILTERS

We recommend filtering the entire system flow. Filters on suction and return line must be fitted in according to the contamination class as indicated in the first pages of the catalogue. Casappa recommends to use its own production filters:



HYDRAULIC FLUID

Use hydraulic fluid conforming to the table as specified in the first pages of the catalogue. Avoid using mixtures of different oils which could result in decomposition and reduction of the oil's lubricating power.

STARTING UP

Check that all circuit connections are tight and that the entire system is completely clean. Insert the oil in the tank, using a filter. Bleed the circuit to assist in filling. Set the pressure relief valves to the lowest possible setting. Turn on the system for a few moments at minimum speed, then bleed the circuit again and check the level of oil in the tank. Then gradually increase the pressure and speed of rotation until the pre-set operating levels as specified in the catalogue are attained.

PERIODICAL CHECKS - MAINTENANCE

Replace filters regularly to keep the fluid clean. The oil level must be checked and oil replaced periodically depending on the system's operating conditions.

SFP 02 T A

Edition: 02/04.2012

Replaces: SFP 01 T A



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